BEATY - DS
SOURCE FILE

SOHIO ALASKA PETROLEUM COMPANY

3111 "C" STREET
ANCHORAGE, ALASKA

TELEPHONE (907) 276-5111

MAIL: POUCH 6-612
ANCHORAGE, ALASKA 99502

September 9, 1983
cc: #71,330

SEP 12 RECD

Mr. Michael Johnston
Chief, Permits Compliance Branch
U. S. Environmental Protection Agency, Region X
1200 Sixth Avenue
Seattle, Washington 98101

Subject: Air Emissions Compliance Testing and
Start up Operations Notice for
Prudhoe Bay, Alaska Oil Field Facilities.

Dear Michael Johnston:

Sohio Alaska Petroleum Company has new facilities that will begin operation in 1983 in the Prudhoe Bay Oil Field. This letter is to review those facilities that will be starting up and then confirm and summarize telephone conversations made with your office relating to the PSD compliance testing program in 1983 for the Prudhoe Bay Unit.

The facilities that will begin operation in 1983 are the interim gas lift, produced water injection, and low pressure separation facilities. The interim gas lift facility, which includes one 4900 HP Ruston turbine, is located at GC-3. This facility was permitted under Permit No. PSD-X79-05 by the air emissions source exchange effective September 25, 1981. It began start up operations in January 1983. The new produced water injection and low pressure separation facilities in Prudhoe Bay are permitted under Permit No. PSD-X80-09. The produced water injection facilities will include two 7770 HP (Sulzer) turbines, which initially were scheduled to begin start up operations in 1983. However, due to delays these facilities will not start up until 1984. The low pressure separation facilities included four 35,000 HP (G.E.) turbines, two 16.8 MM (Zurn) Btu/hr and three 33.5 MM Btu/hr (Cleaver/Brooks) heaters. Two of these 35,000 HP turbines and the two 16.8 MM Btu/hr heaters will begin operation in November, 1983 at GC-2. The 16.8 MM Btu/hr heaters, located at GC-2, began operation in June of this year.

The PSD permits for these Prudhoe Bay facilities allow for an alternative compliance testing plan for the gas turbines rather than stack testing each of the turbines. Previously, Wayne Grother and I discussed an alternative test plan that included testing three turbines. These are a

4900 HP Ruston turbine located at GC-3; a 35,000 HP G.E. turbine located at GC-2; and a 7,770 HP Suzler turbine located at GC-3. However, there have been logistics problems and delays in start up operations of these turbines and we would like to modify our original plan. The turbine test to be done in 1983 would include one 4900 HP Ruston turbine located at Flow Station 3. This test would take place on September 23, 1983. Testing of the 35,000 HP G.E. turbine at GC-2 and the 7,770 HP Suzler would take place next year in 1984. As I discussed previously in this letter both of these turbines have had start up delays and will not be starting up until November of this year. Under this plan one of each type and size of turbine would be tested, however some of the tests would not take place this year.

The heater testing would include testing one of each type of heater as stipulated in condition 6a of the PSD permit. One of the three 33.5 MM Btu/hr Cleaver/Brooks heater that is part of the low pressure separation facilities would be tested September 22, 1983 the same week that the Ruston turbine is tested. However the 16.5 MM Btu/hr Zurn heater that is part of the low pressure separation facilities would not be tested until next year, since it will only begin start up operations in November, 1983.

Attached is the source test plan from for the Prudhoe Bay Unit prepared by Chemecology, our contractor, for the air emission tests. As was agreed the plan uses a modified Method 20 (Method BAAPCD ST/13A) instead of the Method 7 for heaters and Method 20 for the turbines stipulated in the permits.

The testing of the turbine and heater in the source test plan will procede as scheduled. I hope that the delayed testing plan will meet with your approval and look forward to your hearing from you. Should you have any questions, please contact me (907) 564-4137.

Sincerely,

Lynn Billington

Lynn Billington
Environmental Engineer

Attachment

0089M/LMB

cc: Mr. Wayne Grother-EPA, Seattle
Mr. Stan Hungerford-ADEC, Juneau
Mr. Ron Kreizenbeck-EPA, Juneau
Mr. Doug Lowery-ADEC, Fairbanks
Mr. Robert Poss-EPA, Seattle

CHEMECOLOGY CORPORATION

18823 Porterville Hwy., Bakersfield, CA 93308 • (805) 399-9335
Mailing Address: P.O. Box 1193, Bakersfield, CA 93302

SOURCE TEST PLAN

SOHIO ANCHORAGE
ENVIRONMENT

SEP - 1 '83

Shafer		Dina	
Howard		Wagner	
Griffin		Hanson	
		Leonard	
Hanley		Wilson	
Degler		Batch	
Lynn			

Client: Sohio Alaska Petroleum Company
Mail Pouch 6-162
Anchorage, Alaska 99502

Attention: Lynn Billington
(907) 276-5111

Test Location: Prudhoe Bay Unit

Contractor: Chemecology Corporation
Post Office Box 1193
Bakersfield, CA 93304

Attention: Leslie A. Johnson
(805) 399-9335

Purpose: To determine NOx compliance with permit conditions established by EPA Region X (Permit No. PSD-X80-09)

Testing: September 22 & 23, 1983

Sampling Equipment and Procedure:

A Monitor Labs 8430 NO/NOx Analyzer and a Taylor OA025 Oxygen Analyzer will be used to measure gaseous emissions. (Attachment 1). Volume flows will be measured by EPA Method 2 and 4.

BAAPCD ST/13A procedure will be used in place of Method 7 and 20. (Attachment 2).

Emission Point Information:

1) Rouston Turbine - located at FS #3 (Attachment 3).
Diameter: 4 feet Area: 12.56 ft^2
Disturbance: 7 diameters downstream
3 diameters upstream

Traverse points: 20 Total

Point #	Inches from Edge
1	1.2
2	3.9
3	7.0
4	10.9
5	16.4
6	31.6
7	37.1
8	41.0
9	44.1
10	46.8

2) Heater (Cleaver Brooks) located at GC #2 (Drawings not available)

Diameter: ~ 3 feet Area: 7.1 ft^2
Disturbance: 4 diameters downstream
4 diameters upstream

Traverse points: 24 Total

Point #	Inches from Edge
1	0.8
2	2.4
3	4.3
4	6.4
5	9.0
6	12.8
7	23.2
8	27.0
9	29.6
10	31.7
11	33.6
12	35.2

Process Information:

All units are fired on natural gas. During the compliance testing a fuel sample will be extracted and analyzed in the clients laboratory. A copy of the results, along with fuel rates (when available) will be included in the final report. (Attachment 5).

Data Sheets & Quality Control:

Copies of our field data sheet is attached. (Attachment 6). Also attached are copies of our equipment calibration data. (Attachment 7). If, for any reason, the referenced equipment is replaced new calibration data will be provided on site.

Attachment 1

CONSTANT MONITORING

REF: Bay Area AQMD, Manual of Procedures, San Francisco, CA, Methods ST-5, ST-6, ST-13A, ST-14, ST-19A, January, 1982
: State of California, Air Resources Board, Draft Stationary Source Test Methods, Method 1-100, June, 1979

METHOD SUMMARY:

A representative sample of duct gas was extacted through a probe, filter, condenser and sample line by a pump. The sample was then pumped into a sampling manifold for distribution to one or more sample analyzers. The analyzers output a continuous analog recording of the concentrations of the analyzed gases in the sample. All analyzers were calibrated with EPA Protocol gases (traceable to National Bureau of Standards SRMs) or with recently analyzed gases (analysis by EPA Reference Methods).

SAMPLING SYSTEM:

A Pyrex glass or stainless steel probe with a Pyrex wool or glass fibre mat filter was positioned in the duct. The end of the probe was located at a point of average duct flow and average pollutant concentrations. The probe was connected with a short (about 2 feet) Teflon line to a sample conditioning train. The conditioning train included three glass knockout traps connected in series with Teflon lines and immersed in an ice bath. The train was connected with a Teflon line (¼ inch o.d.) to the pneumatic delivery system which was housed in the monitoring van.

PNEUMATIC DELIVERY SYSTEM:

The Teflon sample line delivered sample gas into a small glass knockout trap, then through an in-line Balston filter and a Hoke four-way selector valve to the Teflon-lined diaphragm sample pump (see accompanying diagram). The flow rate of the sample gas was regulated with main and bypass-flow needle valves and was read on the main flow meter (typical setting 10 SCFH). A 10 PSI pressure-relief valve kept the entire system pressure at a safe level. The manifold pressure was regulated with an exhaust needle valve and was read on the pressure gauge (typical setting 1 PSI). The sample in the manifold was delivered through needle valves and flow meters to the various analyzers.

LEAK CHECK PROCEDURE:

The sampling system was checked for leaks by plugging the end of the probe. The exhaust needle valve was closed and the entire sample flow was directed through one analyzer flow meter (range 0-1.0 SCFH). The bypass valve was closed until the vacuum gauge showed at least 15 inches Hg vacuum. The leak rate was observed at the analyzer flow meter (maximum allowable 2% of total sample flow). The system was checked for leaks before and after sampling.

Attachment 1

CONSTANT MONITORING

CALIBRATION PROCEDURE:

Each analyzer was calibrated before and after each sample run. The Hoke four-way selector valve was used to direct the flow of the various calibration gases into the sample manifold. Each analyzer was calibrated with a zero gas (typically, ambient air or zero grade Nitrogen) and with a span gas (typical span gas concentration 60 to 90 percent of analyzer full scale and/or similar to expected sample concentration). All zero and span checks were recorded and noted on the recorder strip charts.

STRIP CHART DATA REDUCTION:

The analog recordings were averaged over time periods as shown on the data pages (typically 5 minutes, 15 minutes or 30 minutes). The data for each averaging period was digitized and recorded as average percent of full scale. These sample readings were then compared with the zero and span gas readings for calculation of the average concentration for each averaging period.

Any drift[1/] of the zero and span readings from the beginning to the end of a sampling period was corrected by calculating apparent zero and span readings for the midpoint of each averaging period. The sample average concentrations were then calculated from the sample readings and the apparent zero and span readings.

Attachment 1

Instrument Data Reduction

Ref: State of California, Air Resources Board, Draft Stationary Source Test Methods, Method 1-100, June 1979

Definitions:

Z_o = initial zero reading (% full scale)
S_o = initial span reading (% full scale)
Z_f = final zero reading (%full scale)
S_f = final span reading (% full scale)
n = total # of intervals
i = identifier for ith interval
ΔZ = zero drift (% full scale)
ΔS = span drift (% full scale)
Range = ppm or % pollutant at 100% full scale
Z_i = calculated zero at mid-point of ith interval (% full scale)
S_i = calculated span at mid-point of ith interval (% full scale)
R_i = average pollutant reading for ith interval (% full scale)
C_i = drift corrected pollutant reading for ith interval (ppm or %)
SGV = span gas value (ppm or %)

Equations:

$$\Delta Z = Z_f - Z_o$$

$$\Delta S = S_f - S_o$$

$$Z_i = Z_o + i * (Z_f - Z_o)/(n + 1)$$

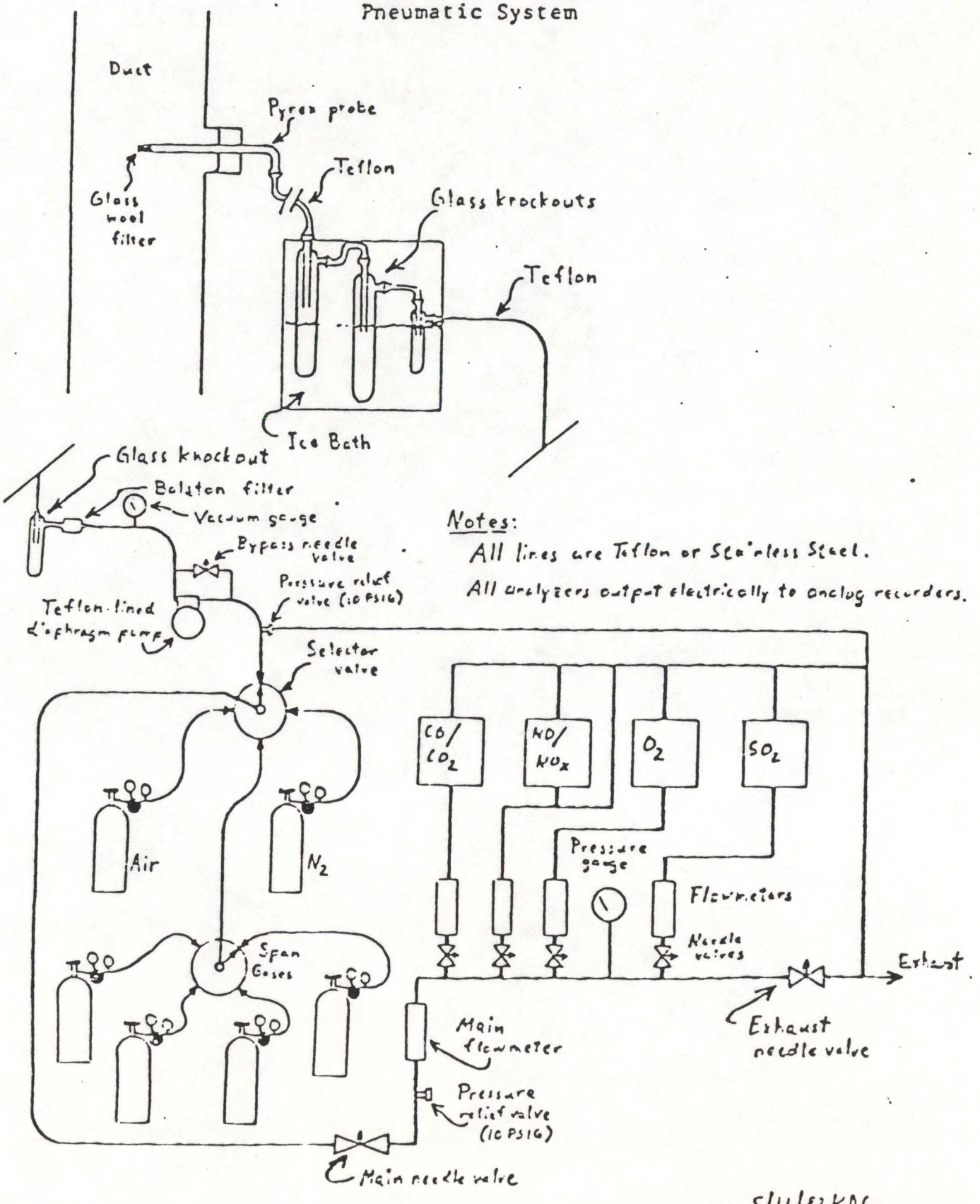
$$S_i = S_o + i * (S_f - S_o)/(n + 1)$$

$$C_i = (R_i - Z_i)/(S_i - Z_i) * SGV$$

Attachment 1

CONSTANT MONITOR

Pneumatic System



Notes:

All lines are Teflon or Stainless Steel.

All analyzers output electrically to onclog recorders.

5/11/82 KJC

Attachment 1

CONSTANT MONITORING

ANALYZERS:

Monitor Labs 8430 Nitrogen Oxides Analyzer

The Monitor Labs chemiluminescent analyzer is used to measure parts per million dry volume of Nitrogen Oxides in the sample gas. The analyzer measures the concentration of NOx by converting NOx to NO and then measuring the light emitted by the reaction of NO with ozone.

The sample gas is drawn into the analyzer by a vacuum pump which partially evacuates the reaction chamber. The sample flows through a NO2-to-NO converter1/ for NOx analysis or may bypass the converter for NO analysis. The sample then flows through a temperature controlled critical orifice into the partially evacuated reaction chamber.

Ambient air is also drawn into the analyzer as an ozone carrier. The air flows through a desiccant cartridge for drying, then through an ozone generator which converts some of the oxygen in the air to ozone. The ozonated air then flows through a temperature-controlled critical orifice into the reaction chamber.

The sample gas and the ozonated air are mixed in the reaction chamber, where the following reaction takes place:

$$NO + O_3 \longrightarrow NO_2 + O_2 + h\nu$$

The intensity of the chemiluminescence is proportional to the concentration of NO in the reaction chamber. The light emitted by this chemiluminescent reaction shines through a window in the chamber onto a photomultiplier tube (PMT). A spinning light chopper wheel between the reaction chamber and the PMT allows the PMT output with no light to be compared electronically with the PMT output with light. The signal is processed electronically and output for recording of the concentration of NO (or NOx if the converter is used).

1/ Either of two types of converter may be used-a 300°C Molybdenum-catalyst converter or a 900°C stainless steel converter.

Attachment 1

CONSTANT MONITORING

ANALYZERS:

Taylor Servomex OA250 or OA580 Oxygen Analyzer

The Taylor paramagnetic analyzer is used to measure the percent dry volume of oxygen in the sample gas. This analyzer contains a quartz-glass "dumb-bell" that is filled with nitrogen and suspended in a non-uniform magnetic field. The spheres at the ends of the dumb-bell are repelled from the strongest part of the field by their diamagnetic property. The dumb-bell therefore rotates to a position where the repellent force and the torque-resistance of the suspension are in equilibrium.

The sample gas flows into a sample cell which encases the dumb-bell. The paramagnetism of any oxygen in the sample gas reduces the intensity of the field and therefore alters the position of the dumb-bell. A small mirror at the center of the dumb-bell reflects a beam of light onto twin photocells (see schematic diagram). The output of the photocells is amplified and fed back to a coil around the dumb-bell. The current required to keep the dumb-bell at the zero position is a direct measure of the magnetic force and is therefore a measure of the oxygen content of the sample gas.

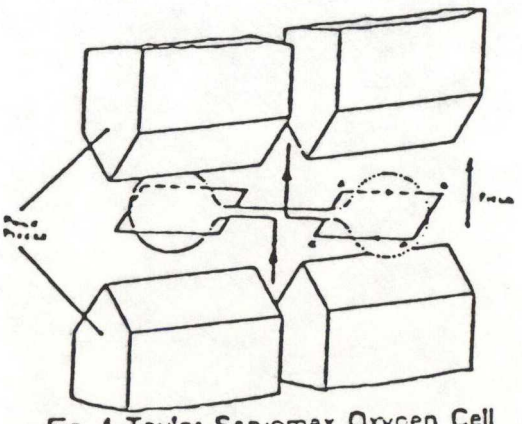


Fig. 1. Taylor Servomex Oxygen Cell — Schematic using Munday's principles

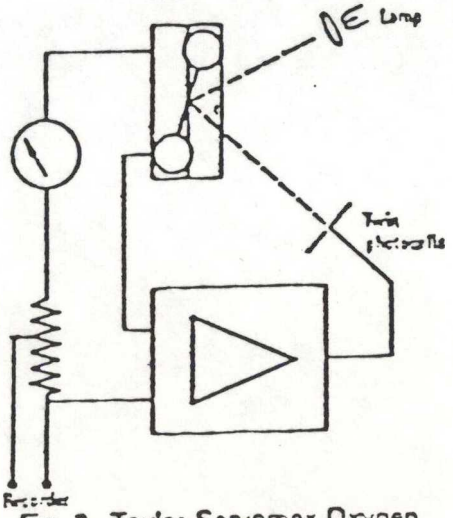


Fig. 2. Taylor Servomex Oxygen Analyser — Schematic

Attachment 2

BAAPCD Source Test Procedure ST-13A

OXIDES OF NITROGEN; CONTINUOUS SAMPLING

1. Applicability

   1.1 This method is used to quantify emissions of oxides of nitrogen.

   1.2 The EPA has granted alternate status (to EPA Method 7) for this method.

2. Principle

   2.1 A gas sample is extracted continuously from the sampling point and conditioned to remove water and particulate matter. Nitric oxide (NO) emissions are determined by passing a small portion of the sample through a chemiluminescent analyzer. The chemiluminescent process is based on the light given off when nitric oxide and ozone react. Nitrogen dioxide (NO_2) concentrations are determined by passing the sample through a catalyst which reduces the NO_2 to NO. the total oxides of nitrogen concentration (NO_2 + NO) is then determined by chemiluminescence.

3. Range and Sensitivity

   3.1 The minimum and maximum measurable concentrations of NO_x depends on the specific chemiluminescent analyzer.

   3.2 The minimum sensitivity of the analyzer shall be ±2% of full scale.

4. Interferences (Thermo con [illegible] catalyst)

   4.1 If the molybdenum catalyst is used, compounds containing nitrogen (other than ammonia) may cause interference.

5. Apparatus

   5.1 Oxides of nitrogen analyzer. Use a Thermo Electron Corp. Model 10A analyzer or its equivalent.

   5.2 Chart recorder. The recorder monitors and records the continuous output from the analyzer.

5.3 Sample conditioning, zero air, and span gas system. The assembly of this system is shown in Figure 1. The sample conditioning system provides a dry, particulate free gas flow to the instrument. The zero air system provides clean dry atmospheric air for instrument calibration. The span gas system provides a known concentration of NO for use in calibrating the analyzer. Except as specified, all materials which come in contact with either the sample or span gas must be constructed of Teflon or stainless steel.

5.4 Sample probe. Use a borosilicate glass tube of sufficient length to traverse the stack being tested. If the stack temperature exceeds 425C (800° F), use a quartz probe.

5.5 Condensers. Use modified Greenberg-Smith impingers with the impaction plates removed and the inlet tube shortened to a length of 10 cm (4 inches), or equivalent.

5.6 Cooling system. Immerse the impingers in an ice bath during the test.

5.7 Particulate filter. Use a Balston type 95 holder with a grade B filter, or equivalent, in the sample system.

5.8 Pumps. Use leak-free, Teflon-lined, diaphragm pumps in the sample and zero air systems. The pumps must have a capacity of at least 40 liters/min (1.5 cfm).

5.9 Back-pressure regulator. Use a back-pressure regulator to maintain the sample and zero gas sample pressures to the instrument at five psig.

5.10 Gas scrubber. Use a bed of silica gel, Ascarite (or soda-lime), and charcoal to remove moisture, carbon dioxide, and hydrocarbons from the zero air system.

5.11 Span gas. Use a high-pressure cylinder containing a known concentration of NO in air. The span gas concentration must be in the same range as the source being tested.

6. Pre-Test Procedures

6.1 Warm-up the instrument according to manufacturer's instructions.

6.2 Assemble the sampling system and analyzer as shown in Figures 1 and 2.

6.3 Leak-test the sampling system by starting the pump, plugging the probe, and determining that the pressure to the analyzer falls to zero. Other leak-tests are acceptable subject to the approval of the Source Test Section.

6.4 Introduce zero air into the analyzer and zero the instrument according to manufacturer's instructions.

6.5 Introduce span gas into the analyzer and calibrate the instrument according to manufacturer's instructions.

6.6 Conduct a preliminary concentration traverse to determine if stratification of the stack gases exists. If the NO_x concentration at any point differs from the average concentration by more than 10%, traverse the stack during the test. If not, sample at any single point.

6.7 Set up the chart recorder according to manufacturer's instructions.

7. Sampling

7.1 Sample at continuous operations for a period of thirty minutes for each test run. Sample at batch operations for thirty minutes or 90% of the batch process time, whichever is less.

7.2 Introduce sample gas into the analyzer at the same flow rate used to calibrate the analyzer.

7.3 Maintain ice in the cooling system throughout the test.

7.4 Calibrate the analyzer before and after each test run. Record each step of the process clearly on the chart recording.

7.5 Conduct three test runs.

8. Auxiliary Tests

8.1 Oxygen concentration. Determine the oxygen concentration simultaneously with each NO_x run in accordance with EPA Method 3, or equivalent test method.

9. Calculations

9.1 Determine the time-averaged concentration of NO on a dry basis for each run from the chart recording.

9.2 Concentration of nitrogen oxides corrected to 3% oxygen.

$$C_{NO,3\%} = C_{NO} \times \frac{17.95}{20.95 - CO_2}$$

where: $C_{NO,3\%}$ = Total concentration of NO_x on a dry basis at 3% O_2

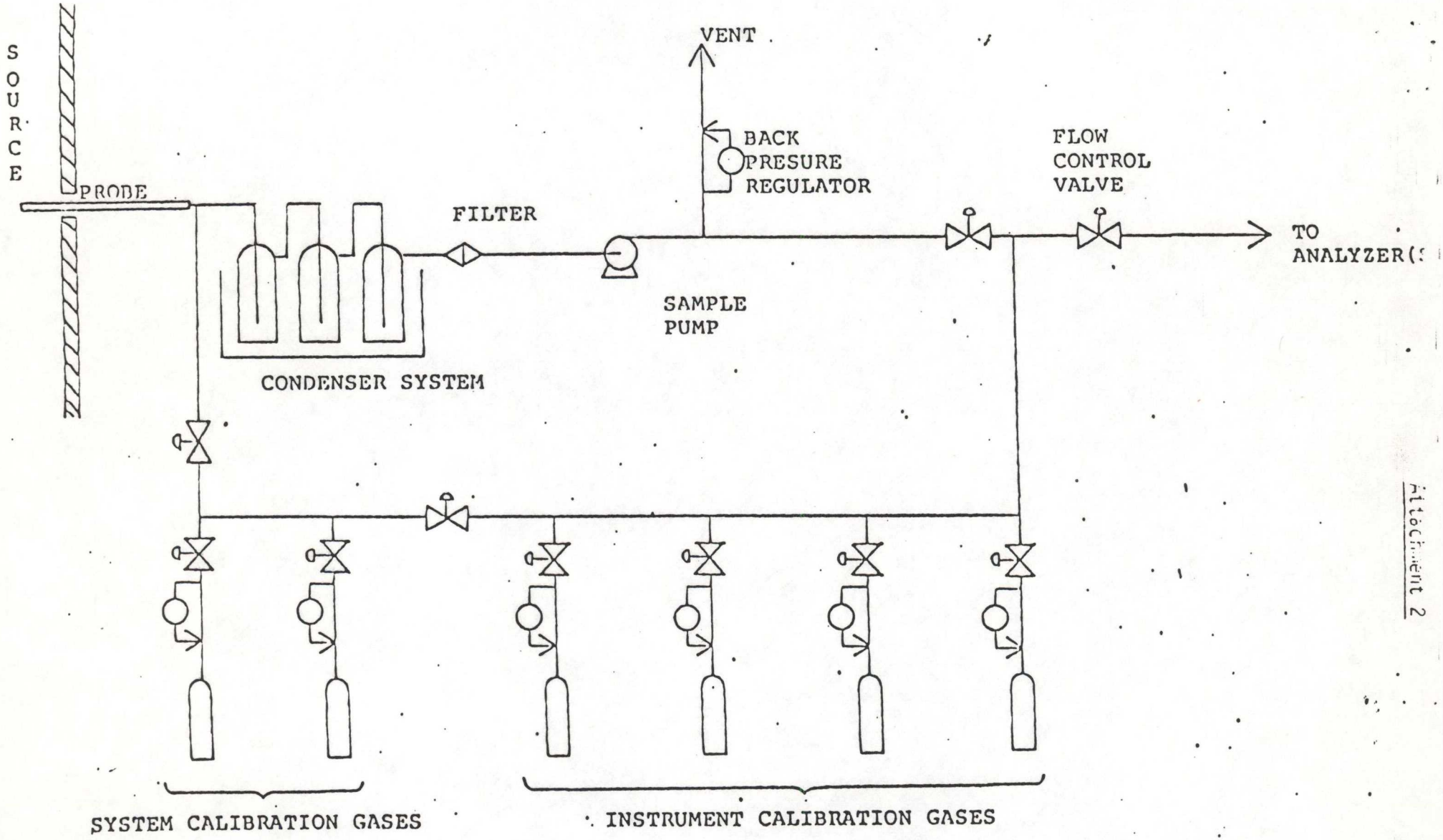
C_{NOx} = Total concentration of NO_x (from 9.1)

CO_2 = Concentration of oxygen on a dry basis (from 8.1)

17.95 = Ambient O_2 less 3%

10. Reporting

The data and information shown in Summary of Source Test Results shall be reported.



Attachment 2

FIGURE 1
SYSTEM AND INSTRUMENT CALIBRATION

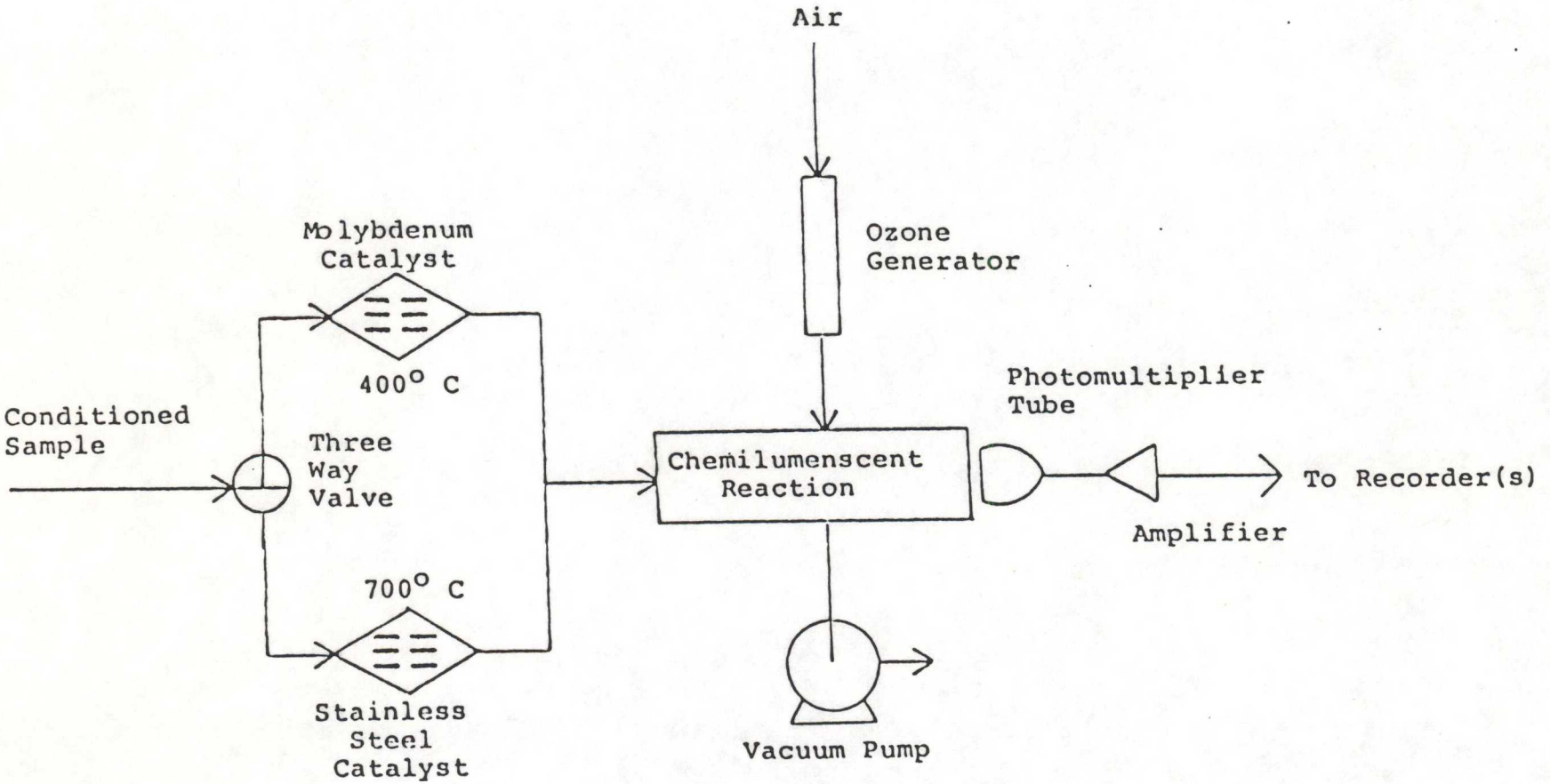


Figure 2
INSTRUMENTAL ANALYSIS OF NITROGEN OXIDES

Attachment 2

Calibration Gases

There are two types of calibration gases necessary to perform a compliance test: a system calibration gas (SCG) and an instrument calibration gas (ICG).

The ICG span concentration must be selected to be within 1.3 to 2.0 times the applicable emission standard. The SCG must be selected to be within 50% to 150% of the ICG span concentration.

I. System Calibration Gases (SCG)

(a) The SCG does not have to be NBS traceable, or have its contents analyzed (an inexpensive gas can be used).

II. Instrument Calibration Gases (ICG)

(a) The ICG shall be certified in writing by the manufacturer to be either:

(1) A National Bureau of Standards, Standard Reference Material (Primary Standard), or

(2) Analyzed according to the procedures outlined in the document entitled: "Traceability Protocol for Establishing True Concentrations of Gases Used for Calibration and Audits of Continuous Source Emission Monitors" (Protocol No. 1) (See Attachment 4).

(b) A photocopy of the manufacturer's certification of analysis must be included in the source test report, and be available for inspection during the test.

Calibration Procedures

I. System Calibration Procedures

The system calibration must be performed before and after the compliance testing each day. System calibration gas shall be used. The sampling equipment shall be operated according to manufacturer's recommendations. All gas conditioning systems used during the test shall be in place, and operational, during the system calibration.

a. Procedure (see Figure 1)

(1) Introduce the system calibration gas (SCG) at the instrument, or instrument manifold.

(2) Record the results. (C@Inst)

(3) Stop the flow of SCG, and allow the sample line to purge itself.

(4) Introduce the SCG at the probe.

(5) Record the results. (C@Probe)

(6) Stop the flow of SCG at the probe.

b. Calculations

(1) Calculate the percent difference between the two above values as follows:

$$\% = \frac{(C@Inst) - (C@Probe)}{(C@Inst)} \times 100$$

(2) If the percent difference is within 5%, testing can proceed.

(3) If the difference is greater than 5%, the system should be checked for leaks or other problems in the sample lines and conditioning system. After the problem is corrected, Section I of this attachment shall be repeated until two consecutive tests are within 5%.

II. Instrument Calibration Procedures

See specific test method. (ST-13A and/or ST-19A)

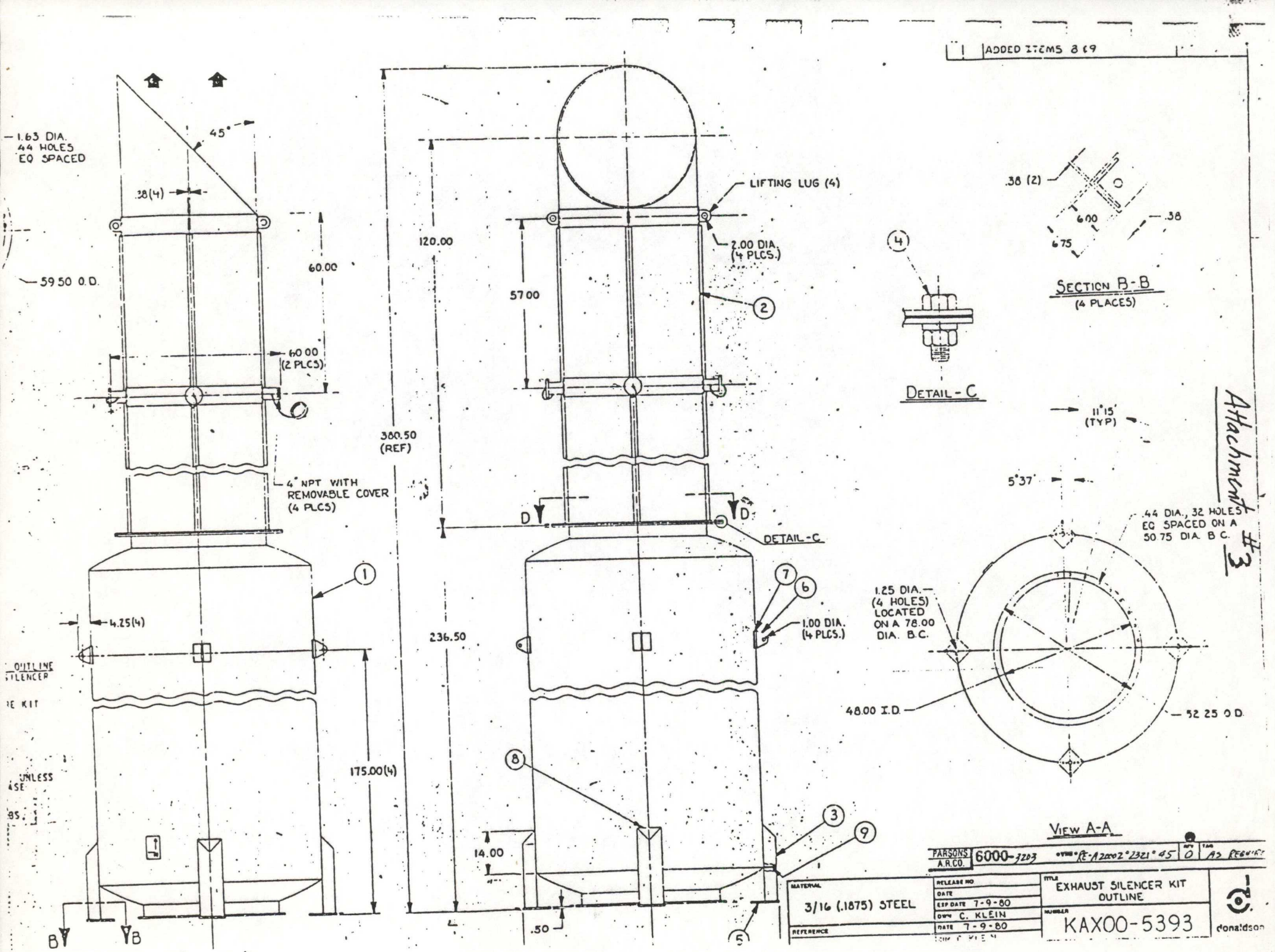
III. Reporting Requirement

The following information shall be supplied in the test report:

a. The results of the system calibration tests.

b. A description and drawing of the sampling train, including the probe, sample line, sample conditioning system, and any filters and/or catalysts employed.

c. The most recent instrument calibration curve and/or linearity check.


1 ADDED ITEMS 8 & 9
1.63 DIA. 44 HOLES EQ SPACED
45°
.38(4)
59.50 O.D.
60.00
60.00 (2 PLCS)
4" NPT WITH REMOVABLE COVER (4 PLCS)
4.25(4)
175.00(4)
B
B
120.00
380.50 (REF)
LIFTING LUG (4)
2.00 DIA. (4 PLCS.)
57.00
2
D
D
DETAIL-C
7
6
1.00 DIA. (4 PLCS.)
236.50
8
3
9
14.00
.50
5
4
DETAIL-C
.38 (2)
.600
.38
.675
SECTION B-B
(4 PLACES)
11°15' (TYP)
5°37'
.44 DIA., 32 HOLES EQ SPACED ON A 50.75 DIA. B.C.
1.25 DIA. (4 HOLES) LOCATED ON A 78.00 DIA. B.C.
48.00 I.D.
52.25 O.D.
VIEW A-A
Attachment #3
PARSONS A.R.CO. 6000-3203 TYPE RE-A2002-2321-45 REV 0 TAG A2 REQUIRED
MATERIAL 3/16 (.1875) STEEL
REFERENCE
RELEASE NO
DATE
ESP DATE 7-9-80
DWN C. KLEIN
DATE 7-9-80
TITLE EXHAUST SILENCER KIT OUTLINE
NUMBER KAX00-5393
donaldson

Attachment #4

Drawings for GC #2 Heater are not available at this time.

Attachment 5

Fuel Analysis

ARCO ALASKA, INC.
PRUDHOE BAY CENTRAL LABORATORY
ANALYSIS REPORT
****

12 AUG 1982

LAB# D22288 ARCHIVE# G48A88:ZA

LOCATION,	CODE,	COMPANY, TYPE
CCP\FFGU	4	ARCO G

SAMPLE MONTH,	DAY,	HOUR,	SAMPLE POINT DESC.
8	10	1442	DOWNSTREAM OF FILTERS

SAMPLE DESCRIPTION
TURBINE FUEL-FUEL GAS HEADER -COMPRESSOR #1813

TEMP,	SAMPL PSIG,	LINE PSIG,	METER#
57	218	218	**

REQUESTOR,
A.SCHUYLER

PROPERTY	VALUE		
NITROGEN	.39	MOL %	
#METHANE	74.6	MOL %	
CARBON DIOXIDE	12.55	MOL %	
&ETHANE	6.78	MOL %	
PROPANE	3.41	MOL %	
ISO-BUTANE	.46	MOL %	
N-BUTANE	1.13	MOL %	
ISO-PENTANE	.21	MOL %	
N-PENTANE	.27	MOL %	
C6+ (CALC)	.21	MOL %	
C6+ (MEAS)	**		
HYDROGEN SULFIDE	8	PPM	PRESENT
GROSS (DRY BASIS)	1040	BTU/CF	
NET (IDEAL GAS)	941.7	BTU/CF	
GROSS (SATURATED)	1021.9	BTU/CF	
SP GRAVITY (CALC.)	.78	.....	
SP GRAVITY (MEAS.)	.782	.....	

COMMENTS:

COMPLETED BY: M.V.C.

REVIEWED BY: D.M.

CCP OPERATION SUPERVISOR D.OLSEN/E.COLLINS
CCP SUPERVISOR J.HEISEL, AFA 202
CCP FACILITY ENGINEER J.GROTH/J.SCHUYLER
FIRE & SAFETY - CARMICAL LAB FILE

Attachment 6

Instrument Data

Company _____ Date _____

Unit _____ Test Run _____

Time	Uncorrected					Drift Corrected				
	%O_2	%CO_2	NO_x ppm	SO_2 ppm	CO ppm	%O_2	%CO_2	NO_x ppm	SO_2 ppm	CO ppm
Average										

Calibration	%O_2	%CO_2	NOx ppm	SO_2 ppm	CO ppm
initial zero (Z_o)					
initial span (S_o)					
final zero (Z_f)					
Final span (S_f)					
Zero drift (ΔZ)					
Span drift (ΔS)					
Span Gas Value (SGV)					
Full scale range					

PUMP METER TEST & CALIBRATION

METER	3-634	STD	3-639	STD	3-637	STD	3-633	STD		STD
DATE	6-10-83		6-10-83		6-15-83		6-16-83			
ORIFICE	NEWPORT		NEWPORT		NEWPORT		NEWPORT			
MAG G.	INC/MAN		INC/MAN		INC/MAN		IN/MAN			
P BAR	29.82		29.82		29.84		29.82			
M.F.	277.702	8.977	145.186	8.818	519.000	8.506	068.433	8.650		
M.I	268.600	⊖	136.000	⊖	510.100	⊖	059.580	⊖		
ACF	9.102	8.977	9.186	8.818	8.900	8.506	8.935	8.650		
T°F	95	75	90	76	103	82%	94	78.5		
R°	555	535	550	536	563	542%	554	538.5		
P"H2O	3.0	1.1	2.1	1.1	3.0	.8	3.5	.9		
P"Hg	.22	.08	.15	.08	.22	.06	.26	.07		
P"Hg	30.04	29.90	29.97	29.90	30.06	29.90	30.06	29.89		
SCFM	8.5623	8.7196	8.6694	8.5492	8.2588	8.1479	8.4260	8.3446		
%	-1.80		+1.75		+1.36		+0.97			
METER FACTOR	1.018		.9827		.9865		.9903			
T ON	8.31		9:47		3:03		8:45			
T OFF	9.01		10:17		3:33		9:15			

METER		STD		STD		STD		STD		STD
DATE										
ORIFICE										
MAG G.										
P. BAR										
M.F.										
M.I.										
ACF										
T°F										
R°										
P"H2O										
P"Hg										
P"Hg										
SCFM										
%										
METER FACTOR										
T ON										

Attachment 7

PITOT TUBE IDENTIFICATION NUMBER 5332 - 9' I.

PITOT TUBE TYPE S

CALIBRATED BY DER

DATE 6-3-83 $\bar{C}_p = \frac{\bar{C}_{pA} + \bar{C}_{pB}}{2} = .781$

A SIDE CALIBRATION

RUN	ΔP_{STD}	ΔP (S)	C_p (S)	DEV.
1	.40	.640	.783	.001
2	.40	.640	.783	.001
3	.40	.645	.780	.002
			$\bar{C}_{PA} = .782$	AVG. = .001

STANDARD DEVIATION OF AVG. DEV. = (Must be <.02)

B SIDE CALIBRATION

RUN	ΔP_{STD}	ΔP (S)	C_p (S)	DEV.
1	.40	.645	.780	.001
2	.40	.640	.783	.002
3	.40	.645	.780	.001
			$\bar{C}_{PB} = .781$	AVG. = .001

STANDARD DEVIATION OF AVG. DEV. = (Must be <.02)

$|\bar{C}_{P\,a} - \bar{C}_{P\,B}| = .001$ (Must be <.01)

CALCULATIONS:

AVERAGE DEVIATION = $\frac{\sum_{1}^{3} |C_{p\,(S)} - \bar{C}_p \text{ (A or B)}|}{3}$ (Must be <.01)

DEVIATION (DEV.) = $C_{p\,(S)} - \bar{C}_p$ (A or B)

$C_{p\,(S)} = C_{p\,(STD)} \sqrt{\frac{\Delta P_{STD}}{\Delta P_S}}$ Where $C_{p\,(STD)} = 0.99$

Scott Specialty Gases Scott Environmental Technology, Inc.
PLUMSTEADVILLE, PA. 18949 PHONE: 215-766-8861 TWX: 510-665-9344

Date Shipped 6/16/83
Our Project No: 319714
Your P.O. No: 4848
Page 1 of 1

CHEMECOLOGY
ATTN: LEDIE JOHNSON
P.O. BOX -193
BAKERSFIELD, CA 93302

CERTIFICATE OF ANALYSIS – EPA PROTOCOL GASES*

(Concentrations are in mole % or ppm)

Cylinder Number CAL4478 Certified Accuracy 1 % NBS Traceable Analysis Dates: First 6/6/83 Last 6/15/83

COMPONENTS	CERTIFIED CONC	EXPIRATION DATE	ANALYTICAL PRINCIPLE	PRIMARY STANDARD NBS/SRM's	REPLICATE CONCENTRATIONS FIRST	REPLICATE CONCENTRATIONS SECOND
NITRIC OXIDE	310.6 ppm	12/14/83	CHEMILUMINESCENCE	1686, 1687	310.3 ppm	310.9 ppm
SULFUR DIOXIDE	42.54 ppm	12/15/83	ELECTRO-CHEMICAL	1693, 1694	42.55 ppm	42.52 ppm
NITROGEN	BALANCE					

Cylinder Number _____ Certified Accuracy _____ % NBS Traceable Analysis Dates: First _____ Last _____

COMPONENTS	CERTIFIED CONC	EXPIRATION DATE	ANALYTICAL PRINCIPLE	PRIMARY STANDARD NBS/SRM's	REPLICATE CONCENTRATIONS FIRST	REPLICATE CONCENTRATIONS SECOND

*We hereby certify the cylinder gas has been analyzed according to EPA Protocol No:

Analyst Penrose Hallowell Jr. PENROSE HALLOWELL, JR. Approved By Francis E. Nevill FRANCIS E. NEVILL

The only liability of this Company for gas which fails to comply with this analysis shall be replacement thereof by the Company without extra cost.

Scott Specialty Gases Scott Environmental Technology, Inc.
PLUMSTEADVILLE, PA. 18949 PHONE: 215-766-8861 TWX: 510-665-9344

Date Shipped 8-4-83
Our Project No: 321116
Your P.O. No: 3814
Page 1 of 1

GEOECOLOGY
1801 PORTERVILLE HWY
BAKERSFIELD, CA 93308

ATTN: LESLIE JOHNSON

CERTIFICATE OF ANALYSIS – EPA PROTOCOL GASES*

(Concentrations are in mole % or ppm)

Cylinder Number CAL-7232 Certified Accuracy 1 % NBS Traceable Analysis Dates: First 4/14/83 Last 8/3/83

COMPONENTS	CERTIFIED CONC	EXPIRATION DATE	ANALYTICAL PRINCIPLE	PRIMARY STANDARD NBS/SRM's	REPLICATE CONCENTRATIONS FIRST	REPLICATE CONCENTRATIONS SECOND
SULFUR DIOXIDE	48.80 ppm	2/3/84	ELECTRO-CHEMICAL	1694, 1693	48.80 ppm	48.80 ppm
NITRIC OXIDE	92.35 ppm	2/3/84	CHEMILUMINESCENCE	1683, 1684	92.34 ppm	92.36 ppm
NITROGEN	BALANCE					

Attachment #7

Cylinder Number _____ Certified Accuracy _____ % NBS Traceable Analysis Dates: First _____ Last _____

COMPONENTS	CERTIFIED CONC	EXPIRATION DATE	ANALYTICAL PRINCIPLE	PRIMARY STANDARD NBS/SRM's	REPLICATE CONCENTRATIONS FIRST	REPLICATE CONCENTRATIONS SECOND

*We hereby certify the cylinder gas has been analyzed according to EPA Protocol No:

Analyst Penrose Hallowell, Jr. PENROSE HALLOWELL, JR. Approved By FRANCIS E. NEVILL

The only liability of this Company for gas which fails to comply with this analysis shall be replacement thereof by the Company without extra cost.